

REMARKS

This application has been amended. Specifically, the limitations of claims 6 and 10 have been added to claim 4 and the upper limit of the peroxide amount has been amended from 5 parts by weight to 25 parts by weight. Support for these amendments can be found in original claims 4, 6 and 10 as well as on page 38 of the specification as filed. Thus, no new matter has been added. Claims 1-3, 6, 10-20, 22, 24, 27, and 30-34 have been canceled. Accordingly, claims 4-5, 7-9, 21, 23, 25-26 and 28-29 are currently pending, of which claim 4 is in independent form.

Claims 1-34 stand rejected under 35 U.S.C. §103(a) for obviousness over U.S. Patent No. 6,472,082 to Kodemura in view of Japanese Publication No. 2002-196535 ("JP '535"). Additionally, claims 1-34 stand rejected under 35 U.S.C. §103(a) for obviousness over U.S. Patent No. 5,585,433 to Yamamoto in view of Kodemura and further in view of JP '535. For the following reasons, Applicants respectfully submit that the pending claims are not obvious in view of the cited documents of record and thus the outstanding rejections should be reconsidered and withdrawn.

Claim 4 is directed to a process for producing modified cycloolefin copolymers. The process includes the steps of adding a modifier compound and an organic solvent to a base polymer in an inactive atmosphere while stirring to produce a solution and, while heating the solution, adding dropwise 7 to 50 parts by weight of an organic-solvent solution containing 2 to 25 parts by weight of a hydrogen-abstracting peroxide compound dissolved therein. The peroxide compound is added in an amount such that the ratio (in terms of the number of moles of radicals) of the peroxide compound to a polymerizable unsaturated group in the modifier compound is 0.7-2.5/1. The copolymer is then thermally aged and cooled to room temperature. The process is conducted so as to achieve a distribution degree of the modified cycloolefin copolymer in the base polymer in the range of 0.01 to 0.1 expressed in terms of the distribution correlation coefficient (DR) defined by the equation: $(DR) = [(RI) - (UV)]^2$.

Applicants have found that, through the claimed process, the main-chain cycloolefin chains are converted into radicals without ring opening of the cycloolefin

chains, and an "electron accepting/electron donating" relationship is created which allows the conventionally-difficult incorporation of the modifier compound into the cycloolefin main chains to be achieved at a higher level than is achieved by previously-known processes. Because according to the claimed process the addition reaction is possible without ring opening of the main-chain cycloolefin chain skeletons, the inventive method can provide modified cycloolefin copolymers in which the functional groups are added uniformly in the cycloolefin copolymer without producing the heterogeneous structures commonly attributed to the ring-opening reactions utilized in conventional addition processes.

As shown in Table 1 and described on pages 41 and 42 of the specification as filed, the claimed method provides for the addition of functional groups to the base polymer molecules more uniformly than is found in conventionally modified cycloolefin copolymers, as expressed in terms of the distribution correlation coefficients (DR), so that the modified cycloolefin copolymers of the invention exhibit high solubility in various solvents.

Kodemura is directed to a modified thermoplastic norbornene polymer that is prepared by grafting an unsaturated epoxy or carboxylic compound onto a norbornene polymer. Kodemura defines the rate of graft modification as the ratio of the total number of moles of the modifying group compared with the total number of monomer units in the polymer. Kodemura suggests a rate of graft modification of between 10 and 100%. Kodemura also mentions that an organic peroxide can be used as the radical initiator for carrying out the graft copolymerization.

Significantly, Kodemura does not suggest that the amount of organic peroxide initiator added is dependent on the amount of polymerizable unsaturated groups of the modifier compound that are present. In Applicants' method, the peroxide compound is added in an amount such that the ratio of the peroxide compound to a polymerizable unsaturated group in the modifier compound in terms of number of moles of radicals is 0.7-2.5/1. Applicants have found this range to be important because, as described on page 31 of the specification as filed, if this ratio is below 0.7, adequately

abstracting hydrogen from the base polymer is difficult, while if this ratio is above 2.5 the radicals are involved in undesirable side reactions other than hydrogen abstraction. Recognition of this relationship is not present in Kodemura, and Kodemura fails to teach or suggest a process for producing modified cycloolefin copolymers by adding a peroxide compound according to this relationship.

Additionally, while Kodemura discusses that a high rate of graft polymerization is preferred, it does not discuss the uniformity of the modification of the base norbornene polymer, which is one feature of Applicants' method as expressed in terms of the distribution correlation coefficient. The Office Action asserts that the distribution correlation coefficient value recited in the claims is inherently present in the modified norbornene polymer of Kodemura. However, given that Kodemura does not control the ratio of peroxide radicals to radicals of polymerizable unsaturated groups in the modifier compound, in addition to the lack of any focus on the uniformity of the functional group addition, it is entirely speculative to assume the distribution degree of the modified norbornene polymer in Kodemura falls with the distribution correlation coefficient values recited in the claim.

JP '535 is cited as allegedly teaching the acid value ratio of the modified cycloolefin copolymer claimed in claim 3. Claim 3, as well as the remaining claims directed to the modified cycloolefin copolymer, are no longer pending. Only claims directed to the process for producing modified cycloolefin copolymers are now pending. JP '535 does not cure the deficiencies of Kodemura discussed above with respect to a process for producing modified cycloolefin copolymers.

Thus, Kodemura in view of JP '535 does not teach, suggest or render obvious the presently claimed process or the effectiveness thereof in creating a uniformly-modified cycloolefin copolymer.

Yamamoto is directed to a cycloolefin resin composition comprising a cycloolefin resin, an elastomer or crystalline polyolefin, and a polyamide resin. The cycloolefin resin may be a cycloolefin random copolymer that is graft-modified with an unsaturated carboxylic acid or its derivative. The modification rate in the graft-modified

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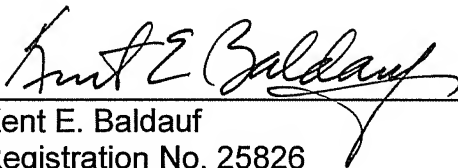
cycloolefin resins in Yamamoto is between 0.01 and 5% by weight.

Claims 1-34 stand rejected under 35 U.S.C. §103(a) for obviousness over Yamamoto in view of Kodemura and further in view of JP '535. Yamamoto, like Kodemura, does not suggest that the amount of initiator added is dependent on the amount of polymerizable unsaturated groups in the modifier compound. Further, Yamamoto, like Kodemura, does not discuss the uniformity of the modification of the polymer but only discusses the modification rate. Reference to Kodemura and JP '535 does not cure these deficiencies in Yamamoto for the reasons discussed above. Thus, Yamamoto in view of Kodemura and further in view of JP '535 does not render obvious Applicants' invention.

For the foregoing reasons, Applicants submit that the pending claims are patentable over the cited documents of record and are in condition for allowance. Accordingly, reconsideration of the outstanding rejections and allowance of pending claims 4-5, 7-9, 21, 23, 25-26 and 28-29 is respectfully requested.

Respectfully submitted,

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